Supporting Information:

Where resource-acquisitive species are located: The role of habitat heterogeneity

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Table S1. List of soil orders discussed in this study (adopted from https://www.nrcs.usda.gov and https://www.cals.uidaho.edu/soilorders/)

Soil order	**Regions**	**Formation**
Alfisols	Semiarid to moist	Under forest or mixed vegetation cover
Entisols	Many environments such as dunes, slopes, flood plains.	Areas where erosion and deposition are faster than soil development
Histosols	Mostly on saturated areas (bogs, moors, peats, mucks)	Decomposed plant remains that forms in water, forest litter.
Inceptisols	Semiarid to humid environments	Areas with moderate degree of weathering and development
Mollisols	Steppes around the world	Under grass and climate with moderate to pronounced moisture deficit
Spodosols	In undisturbed areas	Areas of coarse texture deposit under coniferous forests of humid regions
Ultisols	Humid areas	Due to fairly intense leaching and weathering process
Vertisols	About 2.4% of ice-free land areas around the world.	In regions having distinct wet and dry seasons.

Table S2. List of predictors in the model

Predictor	**Notation**	**Justification and meaning**
Temperature	temp	Temperature control on traits
Soil moisture	moist	Site wetness effect
Hydrothermal Deficit	deficit	Atmospheric moisture balance
Soil type	soilAlfInc, soilEntVert, soilMol, soilSpodHist	Soil control on traits
Topography	u1, u2 and u3	
Moisture squared	I(moisture^2)	Quadratic control of moisture
Moisture and deficit interaction	moisture:deficit	Effects of wet sites in dry climate and wet climate in dry sites on traits.
Moisture and soil interaction	moisture:soil	Moisture control on traits for different soil types
Deficit and soil interaction	deficit:soil	Deficit effect on traits for different soil types
Temperature and soil interaction	temp:soil	Temperature control on traits for different soil types

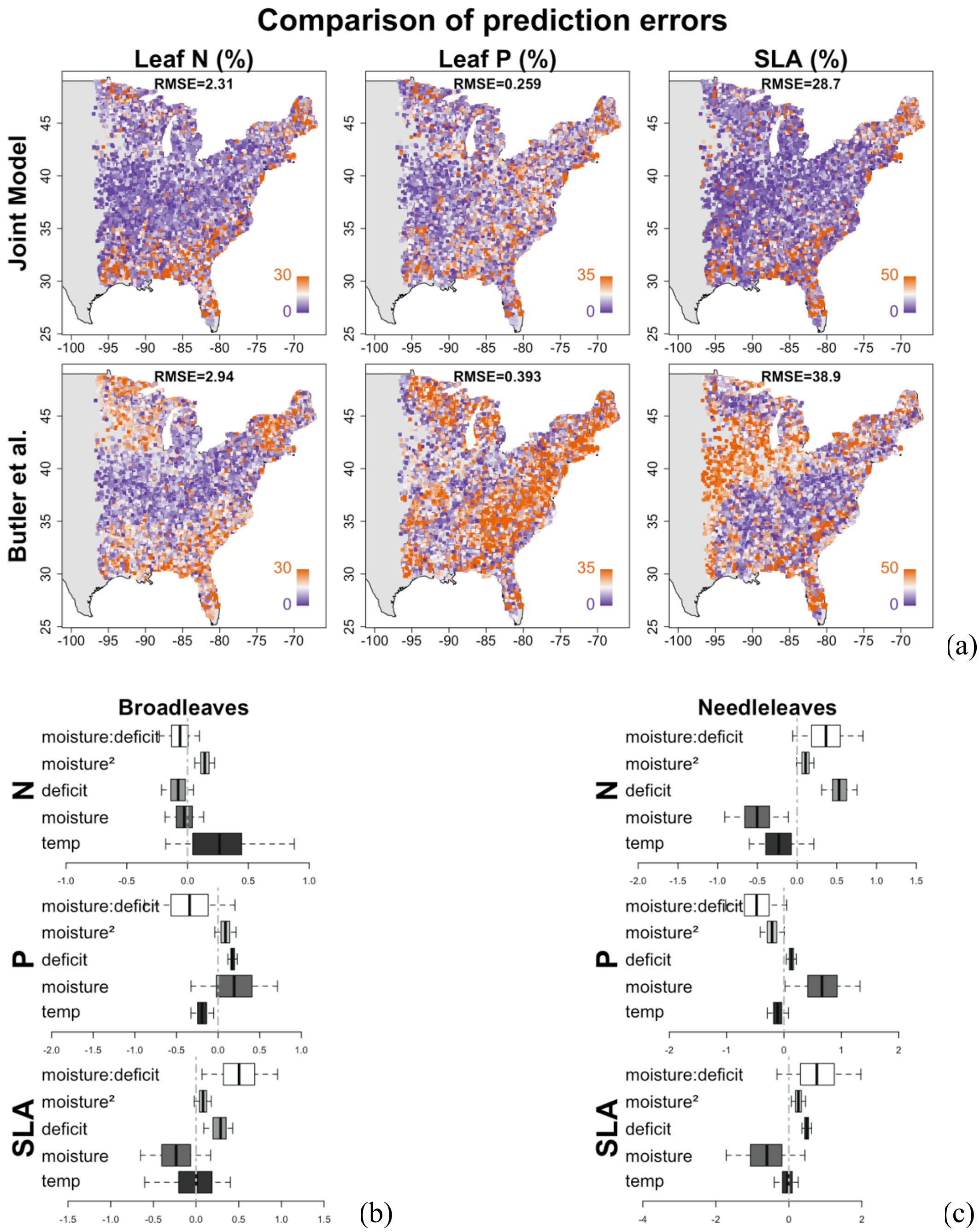

Figure S1. Independent modeling of traits at as in Butler et al. (2017): (a) comparison of prediction errors between our joint model and the indepent model, (b) model fitted coefficients for broadleaf trees and (c) model fitted coefficients for needleleaf trees. Prediction error values were calculated as the absolute difference between CWT values and model predictions. Predictions of the indepent model were obtained from the GitHub repository at https://github.com/abhirupdatta/global_maps_of_plant_traits. Posterior distributions were obtained using the source code fitted to the USA subset of the trait data. While the predicted trait maps do not entirely match the CWT traits, the environmental control may be misleading or contrary for different biomes (e.g. needleleaves vs broadleaves). Joint modeling of traits suggests higher accuracy (lower RMSE and spatial errors across the regions) and hence stronger explanatory power.

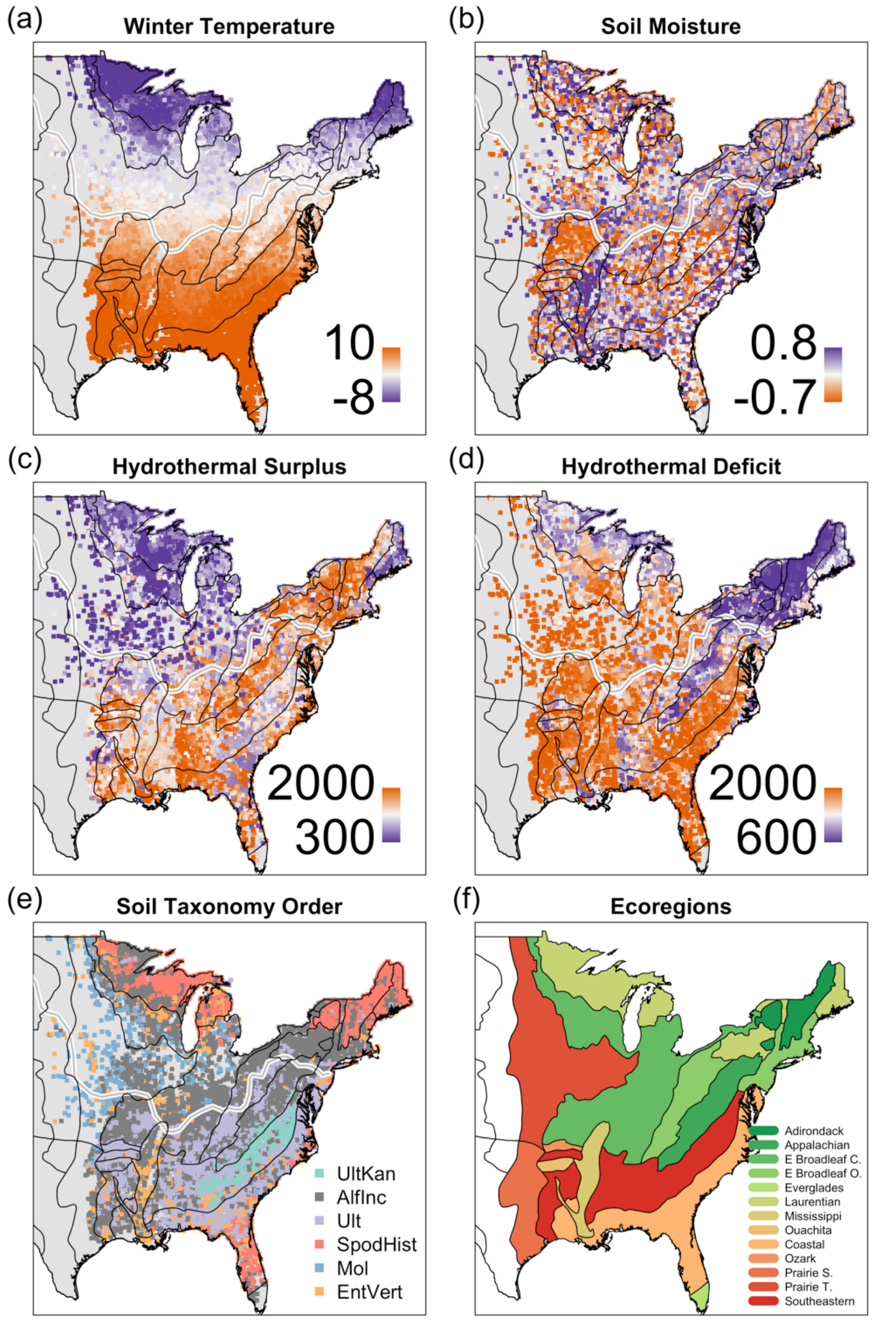

Figure S2. Spatial variability of environmental variables: (a) winter temperature, (b) site moisture index, (c) hydrothermal surplus, (d) hydrothermal deficit, (e) soil types based on taxonomy orders and (f) ecoregions according to USDA Forest Service and the National Atlas of the United States. The approximate glacial limit in (e) roughly aligns with the transition between Alfisols-Inceptisols and highly weathered Ultisols to the south.

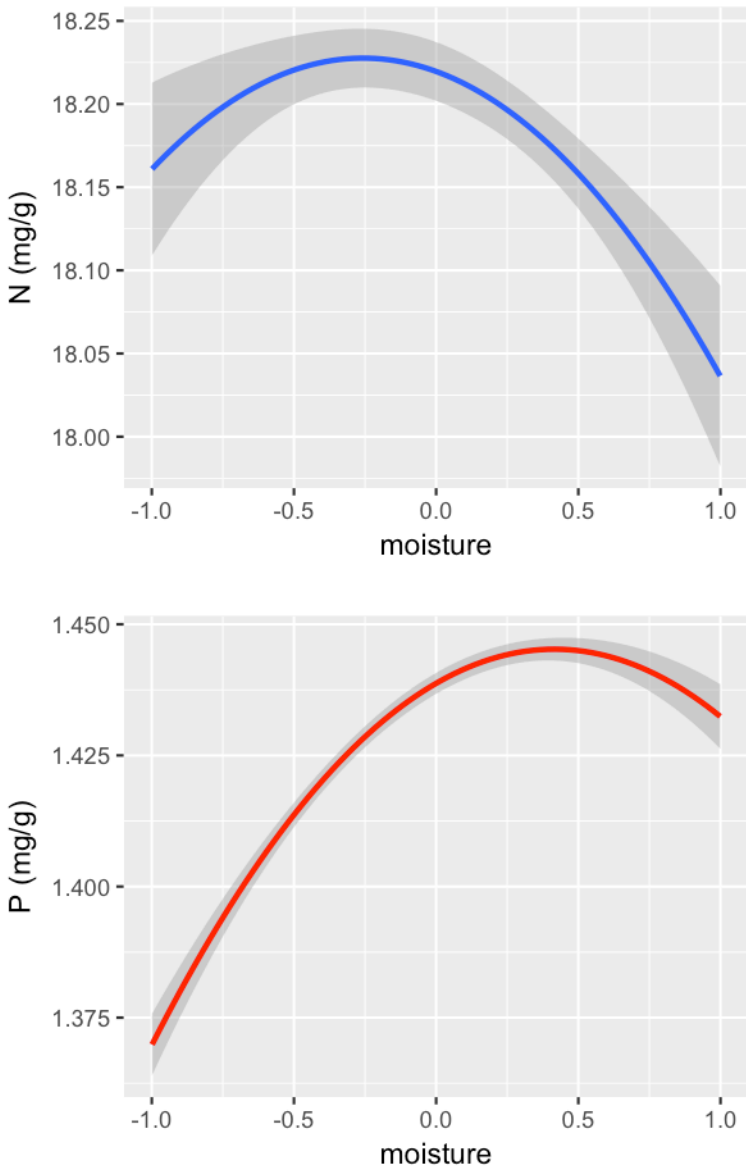

Figure S3. Quadratic relationships of foliar traits with soil moisture

Trait Data

Foliar traits were compiled from Aber and Martin (1999), Alonso et al. (2010), Beaudet, and Messier (2008), Chapin and Kedrowski (1983), Finzi et al. (2001), Gilmore et al. 1995, Grotkopp, and Rejmanek. 2007, LeBauer et al. (2010), Ricklefs, and Matthew (1982), Reich et al. (1998), Rieske (2002), Van Sambeek et al. (2008), Vergutz et al. (2012), Walker et al. (2014).

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